WORKING PAPERS IN ECONOMICS

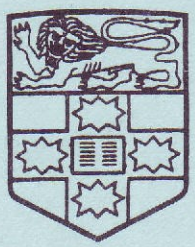
DOES MONEY MATTER IN SINGAPORE?

by

C.G.F. Simkin

No. 73 April 1984.

DEPARTMENT OF ECONOMICS



The University of Sydney
Australia 2006

DOES MONEY MATTER IN SINGAPORE?

by

C.G.F. Simkin

No. 73 April 1984.

National Library of Australia Card Number and ISBN 0 86837 400 8

DOES MONEY MATTER IN SINGAPORE? *

It might be held that, in Singapore, money matters above everything else; but that would be to argue at a commonsense level, to which Economics has never been confined. What this paper asks is the extent to which Monetarist Theory has applied to Singapore.

The Republic is suitable for a case study of Monetarism, which stresses the importance of price stability and its connection with monetary control because, with Malaysia, it has had comparatively low rates of inflation, remarkably low for an exceptionally open economy in a period of world inflation. From 1961 to 1972 Singapore's consumer price index never rose by more than 3.3 per cent a year, and the average annual rate of increase was only 1.2 per cent, one-quarter of that for the group of industrial countries. There were sharp rises of 26.3 per cent in 1973 and 22.4 per cent in 1974, following the first dramatic rise in the world price of oil, and a concurrent two-year rise in the price of imports of 65 per cent. Over the next five years the average annual increase fell back to 2.5 per cent, also about one-quarter of the corresponding average for industrial countries. The second oil shock was associated with increases of Singapore's index by 8.5 per cent in 1980 and by 8.2 per cent in 1981, but the rate fell back to 3.4 per cent in 1982 and was less than 2 per cent in 1983.

Table 1 gives a more detailed view of rates of inflation in Singapore and other countries. The last row lists simple correlation coefficients between Singapore's rate and those of the other four Asean

TABLE 1

ANNUAL PERCENTAGE CHANGES IN CONSUMER PRICES INDEXES, 1961-1982

Year	Singapore (1)	Malaysia (2)	Thailand (3)	Philippines (4)	Indonesia[a] (5)	S. Korea (6)	India (7)	Japan (8)	Industrial Countries (9)	World (10)
1961	.4	.3	2.4	1.0	(24)	8.3	1.9	5.4	1.7	2.6
1962	.4	.2	3.7	5.8	(78)	6.7	2.8	6.6	2.5	3.6
1963	2.4	3.1	-	5.5	(115)	19.7	2.8	7.8	2.6	3.9
1964	1.4	- .5	.7	8.3	(105)	29.5	14.0	3.7	2.3	4.5
1965	.4	-	.4	2.6	(305)	13.6	8.9	6.7	3.1	4.9
1966	1.9	.9	4.0	5.3	(1,046)	11.8	11.3	4.9	3.5	5.0
1967	3.3	4.5	4.3	6.3	(172)	11.1	13.4	4.1	2.9	4.2
1968	.7	- .1	1.0	2.5	(144)	10.9	3.0	5.3	3.9	4.4
1969	- .2	.4	2.4	1.9	16.5	12.5	1.7	5.3	4.8	5.1
1970	.3	1.9	-	14.0	12.4	16.1	5.1	7.6	5.6	6.0
1971	1.8	1.7	.2	15.0	4.6	13.4	3.3	6.2	5.2	5.9
1972	2.1	3.2	4.3	10.1	6.3	11.7	6.2	4.4	4.7	5.8
1973	26.3	10.4	15.4	14.0	31.1	3.2	17.8	11.8	7.7	9.5
1974	22.4	17.4	24.5	34.5	40.5	24.5	27.3	24.3	13.3	16.5
1975	2.7	4.5	5.2	8.1	19.0	25.3	5.6	11.9	11.1	13.7
1976	-2.0	2.6	4.2	6.2	19.8	15.3	-7.8	9.3	8.3	10.9
1977	3.3	4.0	7.6	7.9	11.1	10.1	2.5	8.1	8.4	11.2
1978	4.7	4.9	7.0	7.6	8.1	14.5	2.9	3.8	7.2	9.5
1979	4.0	3.6	9.9	12.6	21.9	18.3	6.4	3.6	9.1	12.5
1980	8.5	6.7	19.7	17.8	18.3	28.7	11.4	8.0	11.9	15.2
1981	8.2	9.7	12.7	13.0	12.2	21.3	13.0	4.9	9.9	14.1
1982	3.9	5.8	5.5	12.5	9.5	7.3	---	---	---	12.8
Mean	4.4	3.9	6.7	9.8	99.0	15.2	7.2	7.2	6.2	8.2
Std. Devn.	6.9	4.3	6.6	8.5	222.2	7.1	7.1	4.5	3.4	4.3
Variation	158	109	101	84	225	47	97	63	55	53
Correlation: r_{1i}	1.00	.864	.804	.702	.774[b]	.654	.770	.654	.544	.497

Sources: I.M.F. International Financial Statistics, Yearbook, 1983 and May 1983.
UNECAFE: Economic Bulletins for Asia and the Far East for (3).

Notes: a. 1961-1968 Djakarta only
b. 1969-1982; the adjusted coefficient is .7[illegible]
Variation is (standard deviation/mean) x 100.

countries, India, South Korea, Japan, the group of industrial countries and the world average as computed by the IMF. Although strongly influenced by the exceptional increases of 1973-74, these correlations point to something like a common causal process for Asean countries including, after 1969, Indonesia in its recovery from the disasters of the Soekarno regime. They also point to a closer association of Singapore's inflation rate with that of Japan than with that of the group of industrial countries, but only because Japan is also an exceptionally large importer of oil.

1. Simple Monetarist Tests

The simplest Monetarist assertion, often made by Milton Friedman, is that there is a strong, and well-nigh universal, positive association between the quantity of money and the monetary value of the national income. This is taken to indicate stability in money's (income) velocity of circulation or, failing that, stability in the demand for money as a function of money income. The data in Table 2 seem to support that claim as they yield a regression equation ,

$$\text{Ln } M = -1.211 + .986 \text{ Ln}(PY) \qquad N = 15,\ \bar{R}^2 = .990,\ F = 1{,}431 \tag{1}$$

M denoting money in the narrow sense usually labelled M1, P the GDP deflator and Y the value of GDP at constant prices. From (1) we can deduce

$$P = 1.014m - y \tag{1a}$$

Lower case letters denoting percentage rates of change. That of course, would perfectly accord with the simplest form of the Quantity Theory of

TABLE 2

MONEY, INCOME AND INTEREST, 1968-1982

YEAR	M	PY	L	Y	I
1968	1000	1000	1000	1000	1000
1969	1145	1163	1119	1137	1060
1970	1343	1345	1291	1293	1000
1971	1454	1581	1338	1455	1000
1972	1970	1890	1719	1650	938
1973	2188	2365	1702	1840	1125
1974	2383	2907	1604	1957	1281
1975	2904	3099	1909	2037	885
1976	3352	3378	2172	2189	848
1977	3692	3698	2356	2362	878
1978	4174	4092	2622	2566	956
1979	4774	4740	2785	2807	1185
1980	5235	5609	2843	3098	1700
1981	6179	6575	3154	3406	1479
1982	6955	7265	3423	3622	1166
Mean	3250	3380	2069	2161	1096
Std.Devn.	1883	1968	766	813	238
Variation	58	58	37	38	230
Growth Rate	14.3	14.3	8.7	8.9	2.4

Notation: M = M1 = currency outside banks plus cheque deposits of the public.

P = GDP deflator

L = M/P

Y = GDP at 1968 prices

I = Index of banks' minimum lending rate

Sources: Yearbook of Statistics, Singapore, 1982; Economic Surveys of Singapore.

money, and gives a velocity of 3.357.

Modern Monetarists, however, prefer another, more sophisticated version of this theory, formulating it in terms of real money balances, denoted by L = M/P, and allowing, after Laidler's correction of Friedman's empirical work,[1] an influence on L from the rate of interest, I, as well as from real income, Y. That, too, seems to be "verified" by Table 2, from which we can estimate

$$\text{Ln } L = 1.253 + 1.019\text{Ln } Y - .205\text{Ln } I \qquad (3)$$
$$(30.9)\quad (48.1)\qquad (10.4)$$

$N = 15$, $\bar{R}^2 = .985$, $F = 455$, D-W = 1.313
t statistics are in parentheses.

We might, of course, refine it further by substituting a measure of "permanent income" for Y, and by adding an influence from some measure of the "expected rate of inflation". But such measures are difficult, the series are short, and the adjusted coefficient of correlation is already quite high.[2] From (2) we may deduce

$$P = m - 1.019y + .205i \qquad (3a)$$

a similar result to (1a) but recognizing a positive influence on inflation from percentage change in the rate of interest. Equation (2) has, of course, the same form as the Keynesian liquidity demand function, but here Monetarists would stress the stability of this function and Keynesians its instability, due to sudden or erratic changes in the "state of long-term expectation".

Since Friedman's presidential address[3] to the American Economic Association, Monetarists have used the "expectations-augmented" Phillips curve as the "missing equation" for separating the income and price

effects of a monetary change. It may be written as

$$p = f(X) + \tilde{p}$$

where X is unobservable excess aggregate demand and $\tilde{p}$ is the equally unobservable expected rate of inflation. We may follow Laidler[4] in taking the ratio of actual to trend real income, $Y/\bar{Y}$ as a proxy for excess demand and use an exponential auto-projection of p as representing $\tilde{p}$; (it differs from the usual geometric lag by making some allowance trend in p).

This idea is tested on the data in Table 3. The trend of real income is well-defined as exponential growth of 8.8 per cent a year, and deviations of $\tilde{p}$ from p, with a mean of -.26, have little systematic bias; to that extent $\tilde{p}$ conforms to "rational expectations". There is, perhaps, further comformity to rational expectations in that $p-\tilde{p}$ and $Y/\bar{Y}$ are uncorrelated ($\bar{R}^2$ = .009), but that means we cannot use the Monetarists' "missing equation" here to separate the price and income effects of monetary change. A more favourable statistical result might be obtained by experimenting with different trends and lags, but that does not seem likely nor, it if did happen, would it be very convincing.[5]

2. Income and Interest

So far, then, the only satisfactory result is (2a), not purely a Monetarist equation. Can we, in view of the failure to find an expectations-augmented Phillips curve, get any other explanation of real income growth, y? One can be found from Table 4, but along Keynesian lines. Here the regression equation is

TABLE 3

ACTUAL AND EXPECTED INFLATION RATES AND ACTUAL AND TREND LEVELS OR REAL INCOME, 1968-1982

Year	p	$\tilde{p}$	$p-\tilde{p}$	Y	$\bar{Y}$	$Y/\bar{Y}$
1968	1.1	(0.0)		4315	4937	.874
1969	2.3	2.0	0.3	4906	5394	.910
1970	1.7	3.2	-1.5	5579	5873	.947
1971	4.5	2.3	2.2	6278	6438	.975
1972	5.4	5.3	0.1	7120	7034	1.102
1973	12.1	6.6	5.5	7941	7684	1.033
1974	15.6	14.4	1.2	8445	8395	1.006
1975	2.4	19.0	-16.6	8790	9172	.958
1976	1.4	2.7	-1.3	9447	10021	.943
1977	1.6	-1.2	2.8	10193	10984	.931
1978	1.8	-0.7	2.5	11071	11961	.926
1979	3.9	1.4	2.5	12114	13068	.927
1980	7.4	3.7	3.7	13367	14227	.940
1981	5.4	8.5	-3.1	14695	15598	.942
1982	3.2	6.4	-3.2	15627	17041	.941

Notation: p = growth rate of GDP deflator

$$\tilde{p} = \frac{\lambda}{\Delta+\lambda}\left[1 + \frac{\Delta}{\Delta+\lambda}\right]p, \quad \lambda = .6$$

y = real GDP

$\bar{Y}$ = exponential trend value of Y

Regressions: $\bar{Y} = 4519e^{.008t}$

$\bar{R}^2 = .814$, $F = 62.1$

$p-\tilde{p} = a_1 + a_2(Y/\bar{Y})$

$\bar{R}^2 = .009$, $F = .118$

Note: The mean of p is 4.65 with standard deviation 4.20; that of $\tilde{p}$ is 4.91, with standard deviation 5.58.

Sources: As for Table 2.

TABLE 4

INCOME, DOMESTIC EXPORTS AND FIXED CAPITAL FORMATION, 1968-1982

(S $ million)

Year	Y	E	F	$\hat{Y}$	e
1968	4315	1433	997	4949	-634
1969	4906	1583	1285	5283	-377
1970	5579	1678	1712	5686	-107
1971	6278	2148	2101	6333	- 55
1972	7120	2794	2411	7042	78
1973	7941	3510	2615	7719	222
1974	8445	4754	2884	8830	-385
1975	8790	4226	2766	8355	435
1976	9447	4917	2909	8967	480
1977	10193	5888	2952	9702	491
1978	11071	6544	3262	10420	651
1979	12114	8082	3741	11907	207
1980	13367	9959	4494	13855	-488
1981	14695	10733	5204	14971	-276
1982	15627	10611	6459	15868	-241
Mean	9326	5257	3053		
Std.Devn.	3508	3294	1455		
Variation	38	63	48		
Growth Rate	8.8	16.0	10.3		

Notation: Y = GDP at 1968 prices

E = Domestic Exports at 1968 prices

F = Fixed Capital Formation at 1968 prices

$\hat{Y}$ = Trend-value of Y

$e = Y - \hat{Y}$

Sources: As for Table 2.

$$Y = 3131 + .723E^{d} + .785F \qquad (3)$$
$$(3079) \quad (10.8) \quad (917)$$
$$N = 15, \ \bar{R}^2 = .985, \ F = 456, \ D\text{-}W = 1.051$$

where E^d denotes real domestic exports of goods and F real fixed capital formation. This seems statistically satisfactory even if serial correlation of residuals is not excluded,[6] and although it might well have been better to attempt inclusion of services in E^d.

Equation (3) is decidedly Keynesian but does not, of course, exclude monetary influences on domestic exports or fixed capital formation, although K.P. Wong found a statistical explanation for private investment solely in terms of lagged government investment and lagged exports for his macro-model covering 1960-1969.[7]

One obvious possibility is the effect of money on the rate of interest, but it seems that this has become largely determined not so much by local monetary conditions as by international levels of interest rates. For, if we accept the banks' minimum lending rate as representative of Singapore rates, and the three months Libor rate, λ , as representative of international levels, there is a strong if imperfect connection between them. Using annual data for 1968-1982 we find

$$I = 4.26 + .481\lambda$$
$$N = 15, \ \bar{R}^2 = .743, \ F = 41. \qquad (4a)$$

It is true that Singapore rates were controlled up to 1972, but we do not get a markedly different result by taking the period 1972-1982;

$$I = 3.97 + .514\lambda$$
$$N = 11, \ \bar{R}^2 = .779, \ F = 36 \qquad (4b)$$

TABLE 5

INTEREST RATES, 1968-1982

(per cent)

Year	LIBOR %	Banks' Min. Lending Rate
1968	6.36	8.00
1969	9.76	8.00
1970	8.52	8.00
1971	6.58	8.00
1972	5.46	7.50
1973	9.24	9.00
1974	11.01	10.25
1975	6.09	7.09
1976	5.38	6.78
1977	6.00	7.02
1978	8.73	7.65
1979	11.96	9.48
1980	14.36	13.60
1981	16.51	11.83
1982	13.00	9.33
Mean	9.37	8.77
Std.Devn.	3.46	1.91
Variation	37	22
Growth Rate	6.9	2.4

Sources: IMF, International Financial Statistics; and as for Table 2.

This is not surprising, Monetarists would agree that, in a small open economy with a developed financial sector, local interest rates would closely vary with world rates.

Keynesians, however, could not deny an alternative monetary influence on domestic exports or private fixed capital formation from variations in the availability of bank credit, whether or not that was reflected in interest rates. For, in A Treatise on Money , Keynes spoke of a "fringe of unsatisfied borrowers", and later added a "finance motive" to other motives for holding money balances,[8] one arising from the need to meet contractual obligations connected with investment activities. S.Y. Lee states[9] that the Monetary Authority makes effective use of persuasion and directives to which the banks respond, especially in regard to credit constraint, in times of inflation. He also states that there has been little scope for open market operations or variation of discount rate, and that there have been moves towards selective credit controls which favour "productive activities".[10]

3. Prices and Exchanges Rates

If real income and interest rates depend mainly on external conditions, and real income also upon fixed capital formation, what, in view of (2), could be a major role for money? All that is left would appear to be determination of the local price level. That, however, also seems to be ruled out because of Singapore's heavy dependence on external trade.

There is a prior problem of selecting a price index, and Table 6 offers a choice of indexes for consumer price and for GDP deflators

TABLE 6

PRICES AND THE TRADE-WEIGHTED EXCHANGE RATE, 1968-1982

Year	P^C	P	P^x	P^m	R^T
1968	1000	1000	1000	1000	(1016)
1969	998	1023	998	1042	(1014)
1970	1001	1040	1042	1092	(1013)
1971	1019	1087	1105	1105	1000
1972	1040	1146	1110	1110	999
1973	1314	1285	1257	1257	957
1974	1608	1485	1770	1749	895
1975	1652	1521	1784	1770	924
1976	1619	1543	1904	1889	916
1977	1672	1567	1979	1974	932
1978	1751	1592	2021	2015	884
1979	1821	1714	2252	2260	857
1980	1976	1841	2591	2621	845
1981	2138	1959	2744	2777	786
1982	2211	2033	2748	2735	772
Mean	1522	1456	1757	1760	898
Std.Devn.	433	346	640	641	73
Variation	28	24	36	36	8
Growth Rate	6.8	5.6	8.8	8.7	-2.2

Notation: P^C = consumer price index

P = GDP deflator

P^x P^m = GDP deflators for exports and imports

R^T = index of trade-weighted exchange rate as compiled by the Overseas Union Bank. A decrease signifies appreciation of the S$.

Sources: As for Table 2, and S.Y. Lee, op.cit., p. 46.

covering GDP itself, exports and imports. It is generally recognized that the GDP deflator is, in principle, a better indicator of inflation than the consumer price index if only because it has a wider coverage. Fortunately, there is little need here to be concerned about their rival merits because, between 1968 and 1982, they had a nearly perfect correlation;

$$P^C = 291 + 1.245P$$
$$N = 21, \bar{R}^2 = .990, F = 1.431$$

There is an even better connection between the GDP deflators for export and import prices, both being measured in Singapore dollars:

$$P^m = -1.000 + 1.022P^x \qquad (6)$$
$$N = 21, \bar{R}^2 = .999, F = 12,987$$

The crucial relation, however, is that between the general GDP deflator and the GDP deflator for imports. We find

$$P = 516 + .534P^m \qquad (7)$$
$$N = 21, \bar{R}^2 = .976, F = 578$$

This could mean that, given the exchange rate for the Singapore dollar, domestic prices are determined by world prices for imports. But this, too, is not inconsistent with a Monetarist finding that, in an open economy with fixed exchange rates, the domestic rate of inflation tends to equal the world rate of inflation.

Since 1973, however, the Singapore dollar has been on "a managed float" that is related to an undisclosed basket of trading partners' currencies, and the float is supposed to be managed with a twin view to keeping export prices competitive and the cost of living stable.[11] Two

local banks have compiled their own indexes of a trade-weighted exchange rate, and that by the Overseas Union Bank has been preferred. It appears from Table 6 that, between 1973 and 1982, import prices, measured in Singapore dollars, rose at an average annual rate of 8.7 per cent a year, and the trade-weighted exchange rate fell by 2.2 per cent. Over this decade, accordingly, management of the float would seem to have offset about one-fifth of the average rise in the foreign prices of Singapore's imports. It added, however, about one-fifth to foreign prices of Singapore's exports.

S.Y. Lee has argued that the movements in the exchange rate would have comparatively little effect on Singapore's exports. They would clearly have none on re-exports, which still account for about one-third of total exports. Domestic exports, moreover, have a high import content, directly and indirectly through the import content of domestic inputs to industrial production, so that added value, in 1980, was only one-quarter of the total value of their production. There would, too, be repercussions of exchange rate changes upon the cost of living and so, to some extent, on industrial wages.[12] If these arguments are accepted it would be more important to emphasize domestic price stability than competitiveness of export prices in regard to exchange rate policy.

4. Money Supply and the Exchange Rate

There is much support for the view that the Monetary Authority of Singapore has come to see management of the exchange rate as its most important task, but it is not so clear what such management is intended to achieve. B. Kapur has pointed out that, in a small open economy, monetary policy and exchange rate policy are inseparable because "specification of

the latter dictates the essential nature of the former".[13] Similarly W. H. Branson has said that domestic price stability requires adjustment of the real money stock to fluctuations in the demand for it, and "this will result in variation of the exchange rate that offsets variation in the world price level".[14] M.J. Fry is more definite about the objective of exchange rate policy having been to stabilise prices; "Singapore has chosen to appreciate its currency in order to maintain domestic price stability".[15] J.R. Hewson, however, is less sure of the Authority's objectives; "monetary management in Singapore seems to have taken on many of the characteristics of a difficult 'juggling act' ... and it is quite frankly difficult to see how the MAS has kept 'all the balls in the air' ", especially as it has quite limited possibilities in regard to open market operations and discount rate policy.[16]

The Chairman of the Monetary Authority[17] has certainly stressed that changes in the money supply are consequences of intervention in the foreign exchange market. "Monetary policy as it is understood in modern industrial countries," he said, "that is, control of the money supply - has no place in Singapore. Nobody in the Monetary Authority bothers if M1, M2 or M3 is going up or down".

Before looking into these questions, it will be as well to decide what measure to use for the money supply. From 1970, when statistics for M3 were first published, to 1982 we obtain the following regressions;

$$M2 = 1{,}779 + 2.937\ M1$$

$$N = 13,\ \bar{R}^2 = .962,\ F = 303$$

$$M3 = -3{,}621 + 3.938\ M1$$

$$N = 13,\ \bar{R}^2 = .968,\ F = 368$$

These point to choice between the three measures as being of little consequence and, if only for reasons of convenience, it seems best to use M1.

From 1970 to 1982 M1 grew at an average annual rate of 18.1 per cent, and its annual increase by 9.2 per cent. The mean annual increase of M1 was only two-thirds of that for bank credit to the private sector, and little more than one-third of a large drain of liquidity to the government sector. Over these thirteen years, indeed, changes in the banking system's net claims on both domestic sectors would have made for an average annual decrease of M1 by $660 million, instead of the actual average increase of $538 million.

This extraordinary situation results from large fiscal surpluses which are themselves an unusual feature of modern government. In Singapore, the private sector has had to transfer large sums of money to the government, a minor part directly because of current budget surpluses or modest subscriptions to government loans, and a major part indirectly as compulsory contributions to the Central Provident Fund or voluntary deposits with the Post Office Saving Bank which use most of them to buy government securities. By no means all these transfers from the private sector are returned to it by spending on public works, repayment of government debt, or withdrawals for purchase of housing. Considerable sums have accumulated, as Table 7 shows, in the form of deposits, mostly with the Monetary Authority, although some appear to have been used to repay external public debt or to acquire publicly owned foreign assets.

The large drain of liquidity has been, to some extent, offset by large net capital flows. Those, however, which have been recorded hardly

TABLE 7

DETERMINANTS OF CHANGE IN THE MONEY SUPPLY, AND CHANGES IN THE EXCHANGE RATE AND RATE OF INFLATION, 1970-1982

Year	Increase of M1	Increases of net claims on: Private Sector	Govt. Sector	External Sector	Other	Percentage change of: Trade-weighted exchange-rate	GDP Deflator
1970	233	243	26	50	- 86	-	1.7
1971	255	193	-159	242	19	-	4.5
1972	625	610	-387	830	-178	- .01	5.4
1973	367	1395	-834	448	-642	-4.20	12.1
1974	226	104	-603	1368	-343	-9.30	15.6
1975	613	223	-1333	1723	-342	3.24	2.4
1976	528	234	-1085	1539	-189	- .87	7.4
1977	412	681	-1323	767	288	1.75	1.6
1978	514	963	-1747	596	702	-5.15	1.8
1979	780	1415	-2014	1567	-189	-3.05	3.9
1980	429	1402	-2248	950	324	-1.40	7.4
1981	1107	2545	-3152	1529	182	+6.85	5.4
1982	915	2139	-4363	1239	1401	-1.78	3.2
Mean	538	931	-1475	993	88	-2.12	5.11
Std.Devn.	269	798	1242	629	433	3.51	4.34
Variation	50	86	84	63	492	- 165	85
Growth Rate	9.2	21.4	-20.6	15.7	-	-	-

Sources: As for Table 2.

sufficed to meet current deficits in the balance of payments; from 1970 to 1982, these deficits averaged $1,900 million a year and the recorded capital inflows, $2,165 million a year. In addition, there was a mysterious "balancing item"[18] which fluctuated greatly but averaged $900 million a year, thus giving an average overall surplus of $1,170 million a year. That, of course, represents net increases in official reserves of foreign exchange, nearly all held by the Monetary Authority.

But for the acquisition of such foreign assets by the Authority[19] there would have been rapid appreciation of the exchange rate and a much smaller offset to the government drain of liquidity; i.e. severe deflation of Singapore prices unless there had been a compensating expansion of bank credit to the private sector. As things were, the Authority intervened in the foreign exchange market to supply Singapore dollars by buying foreign currencies, especially US dollars. Such intervention had the triple effect of offsetting the government liquidity drain, increasing official reserves of foreign exchange, and retarding appreciation of the exchange rate.

Intervention, however, did not result in either a steady growth of M1 or in price stability. Over these years M1 had an average growth rate of 15.1 per cent and a coefficient of variation equal to 85 per cent; the GDP deflator had an average growth rate of 5.1 per cent and a coefficient of variation also equal to 85 per cent. As has been shown the average appreciation of the exchange rate was 2.2 per cent a year with a coefficient of variation of only 8 per cent. From this it seems that steady and moderate appreciation of the exchange-value of the Singapore dollar was the over-riding objective of monetary policy. One purpose, of course, would have been to contain inflation but price

TABLE 8

BALANCE OF PAYMENTS AND RESERVES OF FOREIGN EXCHANGE, 1970-1982
(S$ million)

Year	Current Bal. of Payments	Net Capital Inflows	Overall Bal. of Payments[a]	Balancing Item	Increase of Net Foreign Assets Banks	Monetary Authorities	Other Official[b]	Trade-weighted Exchange Rate[c]
1970	-1751	533	566	1382	-104	154	411	...
1971	-2205	880	975	2302	-272	514	461	1000
1972	-1392	1112	945	1220	-362	892	53	995
1973	-1276	1772	1006	508	-493	741	264	967
1974	-2516	1217	718	2017	421	947	-229	895
1975	-1128	1374	986	1220	212	1501	505	924
1976	-1507	2098	737	146	-306	1774	1037	910
1977	- 788	1461	765	71	-211	977	-233	933
1978	-1029	3304	1413	337	-699	1366	147	884
1979	-1600	2470	1137	543	800	1147	- 31	857
1980	-3349	3612	1434	1147	-292	1946	192	845
1981	-2921	4823	1938	36	-999	2533	-595	786
1982	-2737	4777	2518	480	-715	2455	...	772
Mean	-1900	2165	1170	930	-229	1256	314	896
Std.Devn.	780	1401	563	774	446	694	400	72
Variation	41	65	47	86	196	55	247	3

Notes: a. Equals net increase of official reserves of foreign exchange.

b. Equals net increase of official reserves less that of the Monetary Authorities.

c. Index.

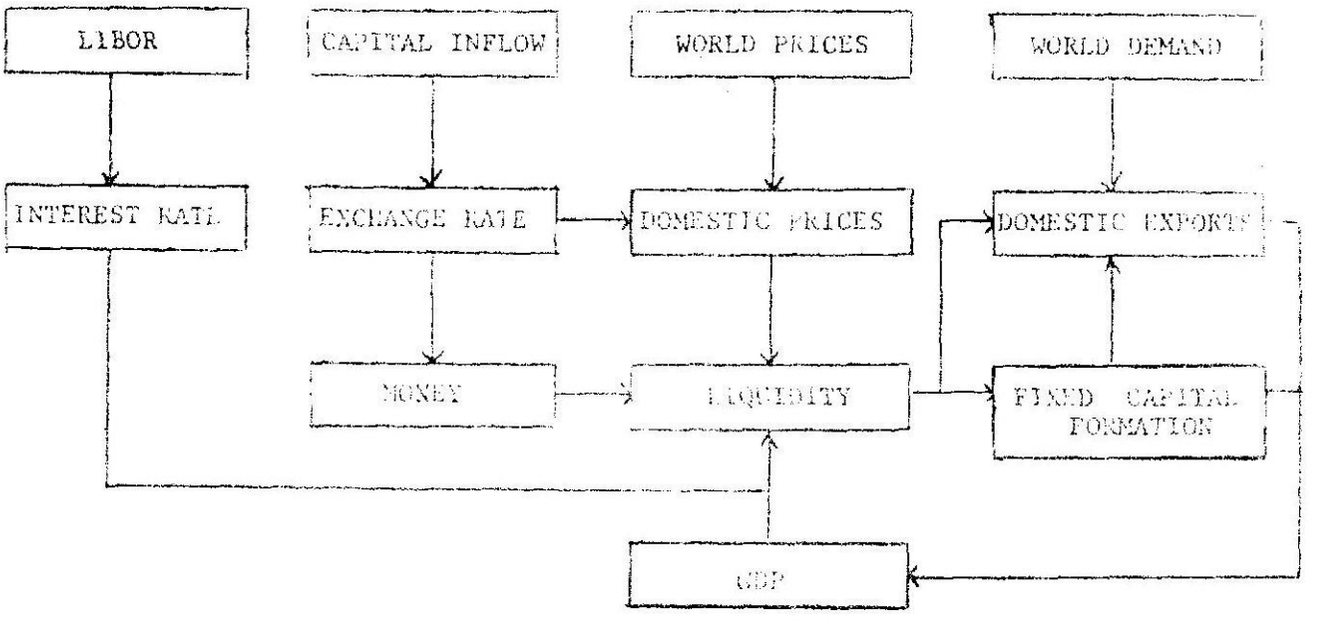
Sourses: as for Table 2.

stability appears to have been subordinated to that of stable growth in real GDP; for, over these thirteen years, the average annual growth of real GDP was 9.3 per cent with a coefficient of variation of 31 per cent.

These considerations support Hewsen's view of a juggling act with three balls corresponding to the objectives of adequate provision of credit to "accommodate economic activity", prevention of "undue" fluctuations of interest rates, and maintainence of "a strong and stable" exchange rate. As he points out, these objectives cannot be fully compatible, but we have seen that less attention come to be paid to regulating interest rates as Singapore developed into a major financial centre. Large capital inflows enabled it to have both an appreciating currency that moderated the transmission of world inflation and permitted a fairly steady growth of real income.[20]

5. Money and Economic Activity

It is time to draw together the threads of this discussion in an attempt to decide how much, and in what ways money has mattered in the Republic of Singapore. The following diagram helps in this respect, arrows indicating presumed causal directions. It does not represent a complete econometric model, only the relations considered in this examination of Monetarism, and then in a somewhat condensed way.



The first causal chain runs from Libor, representing world interest rates, to the domestic interest rate [equation (4)] and from that to liquidity [equation (2)]. Liquidity, by definition, depends on money and domestic prices, which are governed by foreign prices [equation (7)], given the exchange rate. It is, as usual, supposed that the demand for money is instantaneously adjusted to its supply.

Given the large net drain of liquidity from the private to the public sector, and given also the adverse balance of payments on current account, increases in the money supply depend on net capital inflows (including the "balancing item"), and on interventions by the Monetary Authority in the foreign exchange market in order to prevent these

inflows from having a full effect in appreciating Singapore's floating dollar.

Given world prices, the demand for Singapore's domestic exports must depend on the conditions of world demand, but their supply also depends upon domestic liquidity, which is needed to finance working capital. Between 1968 and 1982, the adjusted coefficient of correlation between real domestic exports and liquidity has been found as .941 . Their supply, of course, must also depend on provision of fixed capital, but with a time lag; the adjusted coefficient of simultaneous correlation was only .149 .

Fixed capital formation itself also depends upon liquidity, both through direct capital inflows for this purpose and through borrowings from banks or other local financial intermediaries. Private capital formation would be much more sensitive to liquidity changes than public capital formation; but, from 1973 to 1982, the latter was, on average, less than one-quarter of total capital formation. We might also note that annual increases of bank credit to the private sector have been a substantial proportion of gross domestic capital formation - two-fifths over 1979-1981.

Both domestic exports and fixed capital formation, as equation (3) showed, can be regarded as major determinants of real GDP.

Money, then, has mattered in Singapore, but more in a Keynesian than in a Monetarist way. It is impossible to accept literally the expressed view of the Chairman of the Monetary Authority that "monetary policy ... that is, control of the money supply - has no place in Singapore". Although the primary aim of the Authority is control of

the exchange rate, not control of M1, M2 or M3, this involves corresponding changes in the money supply to an extent depending on actual adjustments of the rate. The rate, moreover, seems to have been adjusted so as to promote stable growth of real income by ensuring adequate liquidity for domestic exports and for fixed capital formation.

Nor, of course, can it be doubted that monetary mismanagement, - policies which lead to excessive or uncontrolled expansion of the money supply, - could have serious consequences in Singapore, as it has had in too many other countries. Hong Kong is a recent example. Recognition of the importance of money, actual or potential, is not bound to acceptance of Monetarist theories about the ways in which money affects the working of an economy.

C.G.F. SIMKIN,
February, 1984.

Footnotes

* I gratefully acknowledge helpful comments on an earlier draft by Lee Sheng Yi, Wong Kum Poh, Tsao Yuan, Basant Kapur and John Kerr.

1. "The Rate of Interest and the Demand for Money - Some Empirical Evidence", Journal of Political Economy, 1966.

2. Some other results may be used to check (2).

   (a) S.Y. Lee, using quarterly data, 1968I - 1982I, found

   $$\underset{(-21.47)}{\text{Ln L} = -4.104} + \underset{(38.08)}{.962\text{Ln Y}} - \underset{(2.97)}{.127\text{Ln I}} - \underset{(-.90)}{.215\ \Delta\text{Ln P}}$$

   $$\bar{R}^2 = .965, \text{ D-W} = 1.695$$

   where I is the bank's three-months deposit rate and P is the consumer price index. Monetary Policy and Foreign Exchange Management in Singapore (Mimeo, 1982).

   (b) M.S. Khan, using quarterly data, 1971-1979, found

   $$\underset{(2.67)}{\text{Ln L} = .217\text{Ln Y}} - \underset{(3.51)}{.028\text{Ln I}} - \underset{(3.79)}{1.313\ \text{Ln P}_{-1}} + \underset{(11.46)}{.754\text{Ln L}_{-1}}$$

   $$\bar{R}^2 = .925, \text{ SEE} = .017, \text{ D-W} = 2.08$$

   Here I = overnight, interbank rate and P = consumer price index. Ch. 3 of Monetary Authority of Singapore, Papers on Monetary Economics, 1981.

   (c) W. H. Branson using annual data, 1967-78, found

   $$\underset{(0.9)}{\text{Ln L} = .35} + \underset{(26.0)}{.94\text{Ln Y}} - \underset{(-2.8)}{.041}$$

   $$\bar{R}^2 = .988, \text{ D-W} = 1.23.$$

   Here I is the prime lending rate. Ch. 6, idem.

   (d) K.P. Wong, using annual data for 1961-1978, found

   $$\underset{(2.0435)}{\text{Ln L} = .2927} + \underset{(52.4411)}{.875\text{Ln Y}} - \underset{(6.5206)}{.3523\text{Ln I}}$$

   $$\bar{R}^2 = .9947, \text{ D-W} = 1.6084$$

   Essays on the Singapore Economy (1982).

3. "The Role of Monetary Policy", American Economic Review, 1968.

4. "Monetarism: an Interpretation and Assessment", Economic Journal, 1981.

5. M.J. Fry also finds reason for "doubt on the existence of a short-term trade off between inflation and the rate of economic growth", in a group of countries which includes Singapore. Inflation and Monetary Policy in Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand, 1960-82. Mimeo, 1983, p.

6. K.P. Wong, using annual data, 1960-1969, constructed a model [illegible] yielded a reduced form equation.

$$Y = 1.299C^g + .663I^g + .514I^g_{-1} + .196E^e + .982E^d + .09[illegible]_{-1}$$

where C^g denotes government consumption, I^g government investment, E^e entrepot exports, E^d domestic exports and, E = total exports. "A Macroeconomic Model of Singapore, 1960-69", Malayan Economic Review, April, 1974.

7. Idem, p. 40.

8. "The General Theory of Employment", Quarterly Journal of Economics, 1937.

9. S.Y. Lee, op.cit., p. 13.

10. Idem, pp. 13-14.

11. S.Y. Lee, op.cit., p. 24.

12. Op.cit., p. 25.

13. Papers on Monetary Economics (1981), p. 108.

14. Idem, p. 122.

15. Paper prepared for a conference on Inflation in East Asean Countries, held in Taiwan on 20-22 May, 1983, p. 34.

16. Papers on Monetary Economics, (1981), p. 180).

17. Interview in the Sunday Times, 1/8/82.

18. It would have comprised proceeds from unrecorded trade with Indonesia and other countries, and similar unrecorded capital transfers. In view of its magnitude and key role in Singapore's foreign exchange market some explanation of the item would be important for understanding monetary changes.

19. In 1973 and 1974 it also experimented with special reserve requirements for net foreign interbank liabilities.

20. Some support for these views can be found in the Annual Reports of the Monetary Authority of Singapore, 1979/80, p. 22, 1980/81, p. 17 and 1981/82, p. 82.

WORKING PAPERS IN ECONOMICS

* 1	I.G. Sharpe	A Framework for Analysis of the Money Supply Process in Australia
* 2	I.G. Sharpe R.G. Walker	Asset Revaluation and Stock Market Prices
* 3	N.V. Lam	Incidence and Stabilization Impact of Tin Export Taxation in West Malaysia
* 4	V.B. Hall & M.L. King	Inflationary Expectations in New Zealand: A Preliminary Study
* 5	A.J. Phipps	Strike Activity and Inflation in Australia
6	N.V. Lam	Incidence of the Rice Export Premium in Thailand
* 7	I.G. Sharpe	Secondary Reserve Requirements, the Monetary Base and the Money Supply in Australia
8	P. Saunders	Labour Demand Functions and the Quasi-Fixity Hypothesis: Some Empirical Results for U.K. Manufacturing Industries, 1963-1974
9	W.P. Hogan	Economic Strategies for Recovery
10	T.P. Troung	Asset Revaluation and Share Prices: A Study using the M.S.A.E. Regression Technique
*11	S. Kim	Instability of Primary Exports, Income Stabilization Policies and Welfare
*12	I.G. Sharpe & P.A. Wolker	Institutional Change, Specification Error, Inflation and the Stability of the Demand for Money Function in the United States, 1901-1974
*13	I.G. Sharpe & P.A. Volker	The Impact of Institutional Changes on the Australian Short-Run Money Demand Function
*14	W.P. Hogan	The Connections Between Foreign Trade and Economic Development: An Empirical Study
*15	F. Gill	The Case of the Black Exodus from the Southern U.S., 1910-1970: Some Lessons for Theory and Applied Theory
*16	A.J. Phipps	The Impact of Wage Indexation on Wage Inflation and Strike Activity in Australia
*17	V.B. Hall	Pricing Behaviour in Australia: A Data Evaluation Study

*18	I.G. Sharpe	Australian Money Supply Analysis: Direct Controls and the Relationship between the Monetary Base, Secondary Reserve and the Money Supply
*19	L. Haddad	Economic Systems: Towards a New Classification
20	G. Lewis	A Strategy for Winning at Roulette
21	R.L. Brown	A Test of the Black and Scholes Model of Option Valuation in Australia
*22	V.B. Hall	Pricing Behaviour in Australian Manufacturing Industry: Hypothesis Testing 1955-1956 to 1967-1968
*23	I.G. Sharpe & P.A. Volker	The Selection of Monetary Policy Instruments: Evidence from Reduced Form Estimates of the Demand and Supply of Money in Australia
*24	V.B. Hall	Excess Demand and Expectations Influences on Price Changes in Australian Manufacturing Industry
*25	I.G. Sharpe & P.A. Volker	The Tradeoff Between Improved Monetary Control and Market Interest Rate Variability in Australia: An Application of Optimal Control Techniques
*26	Evan Jones with the assistance of Mary MacDonald	An Examination of Earnings Differentials in Australian Manufacturing Industry
27	W.P. Hogan	Questions on Structural Adjustment Policies
*28	P. Saunders	Price and Cost Expectations in Australian Manufacturing Firms
*29	W.P. Hogan, I.G. Sharpe & P.A. Volker	Regulation, Risk and the Pricing of Australian Bank Shares 1957-1976
30	W.P. Hogan	Quicksands of Policy-Making
*31	C. Emerson	Taxing Natural Resources Projects
32	R.W. Bailey, V.B. Hall & P.C.B. Phillips	A Small Model of Output, Employment, Capital Formation and Inflation, applied to the New Zealand Economy
33	W.P. Hogan	Eurofinancing: Currencies, Loans and Bonds
34	S. Adei	The Growth of Foreign Investment and Economic Nationalism in Post Independence Ghana: 1957-1975
*35	W.P. Hogan	The 40 Per Cent Investment Allowance

*36	W.P. Hogan	Controlling Eurofinance Markets
37	R.T. Ross	Disaggregate Labour Supply Functions of Married Women: Preliminary Estimates for New Zealand
38	U.R. Kohli	Beginning and End-of-Period Specifications of Asset Market Equilibrium in Balance-of-Payments
39	G. Mills	Government Incentive Contracts with Private Companies: Some Lessons from the Channel Tunnel
40	C.G.F. Simkin	Closer Economic Relations Between Australia and New Zealand
41	U.R. Kohli	Relative Price Effects and the Demand for Imports
42	W.J. Merrilees	Alternative Models of Apprentice Recruitment with Special Reference to the British Printing Industry
*43	P. Saunders	Price Determination in Australian Manufacturing Firms: A Cross-Section Study
*44	W.P. Hogan	Immigration Policies and Issues
45	W.J. Merrilees	Labour Market Segmentation in Canada: A Translog Approach
46	W.J. Merrilees	Pricing Strategies in the Newspaper Industry
47	J.L. Whiteman	The Micro-Foundations of Tariffs and Effective Boundary
48	U.R. Kohli	On the Duality Between Fixed and Flexible Exchange Rates
49	U.R. Kohli	Nonjoint Technologies
50	P. Saunders	Price Determination, Expectations Formation and some Tests of the Rationality of Australian Price Expectations
51	J.L. Whiteman	Rational Choice, Learning-By-Doing and the Personal Distribution of Income
52	J.L. Whiteman	Firm- Specific Human Capital, Experience and the Differential Incidence of Unemployment
52	J. Yates	An Analysis of Asset Holdings in Australian Income Class
54	J. Yates	An Analysis of the Distribution Impact of Imputed Rent Taxation

55	G. Mills	Investment in Airport Capacity - A Critical Review of the MANS Study
56	V.B. Hall & P. Saunders	Pricing Models in Australian Manufacturing The Evidence from Survey Data
57	P. Saunders	How Rational are Australian Price Expectations?
58	F. Gill	The Costs of Adjustment and the Invisible Hand with Special Reference to the Labour Market
59	G. Mills & W. Coleman	Peak Load Pricing and the Channel Tunnel: A Re-Examination
60	J. Yates	Access to Housing Finance and the Campbell Report: the Implications of Implementing the Recommendations of Chapter 37
61	S.S. Joson	The Gatt Agreement on Government Procurements: Canada and Australia
*62	R.T. Ross	General Report of the 1980 Survey of Work Patterns of Married Women in the Sydney Metropolitan Region
63	W.J. Merrilees	Pension Benefits and the Decline in Elderly Male Labour Force Participation
*64	W.P. Hogan	Industry, Employment and Inflation
*65	A.J. Phipps	Australian Unemployment: Some Evidence from Industry Labour Demand Functions
*66	E.M.A. Gross & W.P. Hogan	Short Term Management of the Australian Exchange Rate, 1977-82.
67	V.B. Hall	Industrial Sector Interfuel Substitution following the First Major Oil Shock
68	J. Yates	Access to Housing Finance and Alternative Forms of Housing Loans in the 1980's
69	V.B. Hall	Major OECD Country Industrial Sector Interfuel Substitution Estimates: 1960-79
70	F. Gill	Inequality and Arbitration of Wages in Australia; An Historical Perspective
71	W.J. Merrilees	Do Wage Subsidies Stimulate Training? An Evaluation of the Craft Rebate Scheme.

72	Michael C. Blad	Economic Policy and Catastrophe Theory.
73.	C.G.F. Simkin	Does Money Matter in Singapore?

Papers marked with an asterisk are out of stock. Copies of the others are available upon request from:

Department of Economics
The University of Sydney
N.S.W. 2006

Working Papers in Economics Published or
Accepted for Publication Elsewhere

2	I.G. Sharpe & R.G. Walker	Journal of Accounting Research, Fall, 1975, 293-310
3	N.V. Lam	Journal of the Developing Economies, vol. 17, No. 1, March 1979
4	V.B. Hall & M.L. King	New Zealand Economic Papers, 1976
5	A.J. Phipps	Economic Record, September 1977, 297-319
6	N.V. Lam	Journal of Development Studies, vol. 14, No. 1, October 1977
7	I.G. Sharpe	Australian Journal of Management, April 1976, 85-106
9	W.P. Hogan	Economic Papers, No. 55, The Economic Society of Australia and New Zealand, 29-57
12	I.G. Sharpe & P.A. Volker	Economics Letters, 2, 1979, pp.45-49
13	I.G. Sharpe & P.A. Volker	Kredit und Kapital, vol. 12, No. 1, 1979
14	W.P. Hogan	Some Calculations in Stability and Inflation, A.R. Bergstrom et.al. (eds), John Wiley and Sons, 1978
15	F. Gill	Australian Economic Papers, vol. 19, No. 35, December 1980
18	I.G. Sharpe	Journal of Banking and Finance, 4, 1980 pp. 283-300
21	R.L. Brown	Australian Journal of Management, vol. 3, No. 1, April 1978, 17-36
23	I.G. Sharpe & P.A. Volker	The Australian Monetary System in the 1970s, M. Porter (ed.), Supplement to the Economic Record, 1978
24	V.B. Hall	Economic Record, vol. 56, No. 152, March 1980, 69-81
25	I.G. Sharpe & P.A. Volker	Australian Journal of Management, October 1979, pp. 119-134

27.	W.P. Hogan	Malayan Economic Review, vol. 24, No. 1 April 1979.
28.	P. Saunders	Australian Economic Papers, vol. 19,, No. 34, June 1980.
29.	W.P. Hogan, I.G. Sharpe & P.A. Volker	Economics Letters, 6, 1980, 373-379.
29.	W.P. Hogan, I.G. Sharpe & P.A. Volker	Economics Letters, 7, 1981, 69-74.
30.	W.P. Hogan	Australian Economic papers, Vol. 18, No. 33, December 1979.
38.	U.R. Kohli	Australian Economic Papers, Vol. 21, No. 39, December 1982, 332-344.
39.	G. Mills	Journal of the Operational Research Society 33 (1982), 505-514.
41.	U.R. Kohli	Canadian Journal of Economics, Vol. XV, No. 2, May 1982, 205-219.
42.	W. Merrilees	Applied Economics, Vol. 15, February 1983, pp. 1-22.
43.	P. Saunders	Australian Economic Papers, Vol. 19, No. 35, December 1981.
45.	W. Merrilees	Canadian Journal of Economics, Vol. XV, August 1982, pp. 458-473.
46.	W. Merrilees	Journal of Industrial Economics, Vol. XXXI, March 1983, pp. 291-311.
49.	U.R. Kohli	Review of Economic Studies, Vol. L(1) No. 160, January 1983, 209-219.
50.	P. Saunders	Economic Record, Vol. 47, December 1981.
55.	G. Mills	Seventh Australian Transport Research Forum-Papers Hobart, 1982, pp. 171-210.
59.	G. Mills & W. Coleman	Journal of Transport Economics and Policy, Vol. XVI, No. 3, September 1982.
65.	A.J. Phipps	Australian Economic Papers, Vol. 22, No. 41, December 1983.
67.	V.B. Hall	Economics Letters, 12, 1983, 377-382.